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**Exploration of the ion-ion hybrid resonator** W.A. FARMER, G.J. MORALES, S.T. VINCENA, J.E. MAGGS, UCLA — Fusion plasmas must operate with two dominant ion species: Tritium and Deuterium. In magnetized plasmas with two ion species there exists a unique frequency, the ion-ion hybrid frequency, which has a significant impact on the propagation of Alfven waves. For compressional modes propagating across the magnetic field, the ion-ion hybrid frequency acts as a resonance, which can be used for plasma heating. In contrast, the shear Alfven wave experiences a cutoff at locations where the wave frequency equals the ion-ion hybrid frequency. Due to the periodic variation in the strength of the magnetic field along a field–line in a tokamak, two conjugate ion-ion hybrid points give rise to an inherent shear Alfven wave resonator. Modes trapped within such a resonator could have consequences for plasma heating, proposed alpha channeling schemes, and instabilities. In addition, the modes could have useful diagnostic signatures. Recent experiments in the linear device LAPD at UCLA have demonstrated the existence of such a resonator. Motivated by these results and also by related magnetospheric studies, the properties of a similar resonator in a fusion environment are explored. Theoretical results relevant to the modeling of the resonator in LAPD and in ITER-like plasmas are presented.

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